freedom of form foundation

Action Update

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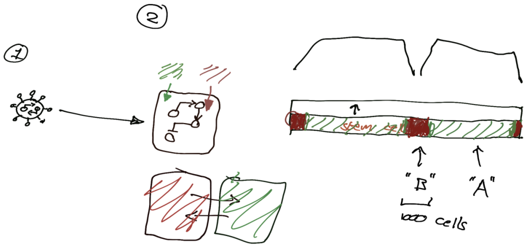
Major update: Integument Review

by Athamanatha Kitsune on Thursday 21st April, 2022

In the last few months, our Integument review team has been hard at work processing masses of existing research and discovering ever more useful papers, organising and collating the data from them and figuring out through spreadsheets, diagrams, bioinformatics databases and even coding their own software tools, what all this means for the genetics and structural understanding of the different integument types.

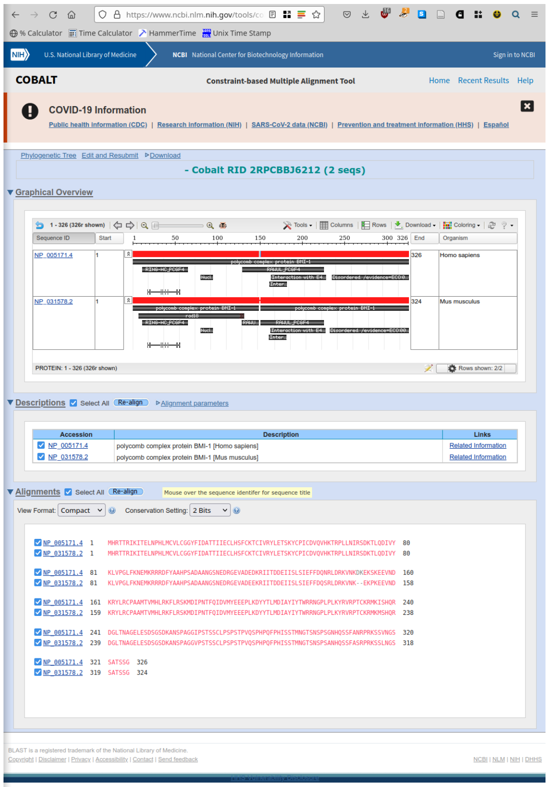
It's not over yet, but nonetheless, it is our pleasure to present to you our progress to date on this epic research paper.



A diagram from our update, by Lathreas, about scales.

Some important points:

- The integument type we have found the most research on is feathers, in part because of their complexity and in part because of the extensive use of chickens in studies.
- Scales are harder to find pre-existing research on, so we are focussing more on what remains to be known about them and what opportunities for research need to be pursued yet in scales. We have also focussed the majority of this update on scales.
- Interconversion between integument types may be more than just a matter of epigenetics; some genes are going to need to be altered or added or deactivated for fully functional growth of the desired integument type. We can tell this from studying the sequence homologies between chicken feather proteins and their closest human equivalents. The homology is basically how well the sequences match when you account for several variables.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Phylogenetic Tree
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Graphical Overview
1 - 326 (326r shown)
Tools
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Descriptions
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Related Information
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Sequence ID	Start	End	Organism
NP_005171.4	1	326	Homo sapiens
NP_031578.2	1	324	Mus musculus

Accession	Description	Links
☑ NP_005171.4	polycomb complex protein BMI-1 [Homo sapiens]	Related Information
☑ NP_031578.2	polycomb complex protein BMI-1 [Mus musculus]	Related Information

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Bioinformatics tools such as NCBI COBALT come in very handy here.

There's much to see and understand now, for the full lowdown on what we're learning, please check out the update document which is coming soon after this newsletter!

Our webpage for Project Integument Review

Podcast Episode 15: Maki

by Athamanatha Kitsune on Thursday 21st April 2022

Sometimes we find the most interesting people to ask their opinion on a subject who are the experts in their field with amazing careers and university tenure. We meticulously assemble the finest crafted discourse, carefully honing each topical question with them, finely engineering the sounds, and deliver it to you in the audiophile's dream of a lossless FLAC file that is our podcast.

But sometimes, sometimes, folks, we look among our closest circle of friends and adopted furry family, select the strangest from among them and throw together a bizarre and loosely tied together ramble on the same subject, then stitch it together into something vaguely resembling an interview to bring to you the re-up-and-downloaded pixellated mobile phone footage production horror that makes you long for hold muzak to ease your ears, that goes somehow by the same name, as the FFF Podcast.

Then we delete that and hastily bring you this instead: the long awaited second installment in our series on prosthetics and people who need them. Introducing the unique and wonderful Maki. With apologies to Stephen Colbert.

Upload coming very soon!

Our Youtube channel
Our Soundcloud

Dem Bones

By Zennith on Tuesday 19th April 2022

In the Technical Roadmap project, we are putting together a detailed, long-term plan for the research & development objectives of our organization in the coming decades.

This project is the spiritual successor to our initial pair of overarching whitepapers in 2018, titled "Anatomical study: Descriptions of potential anthro anatomy" and "Strategic roadmap for research in morphological freedom". Like those initial whitepapers, the Technical Roadmap is first defining the goals (primarily with anatomical descriptions), then figuring out how to accomplish those goals with technologies of interest.

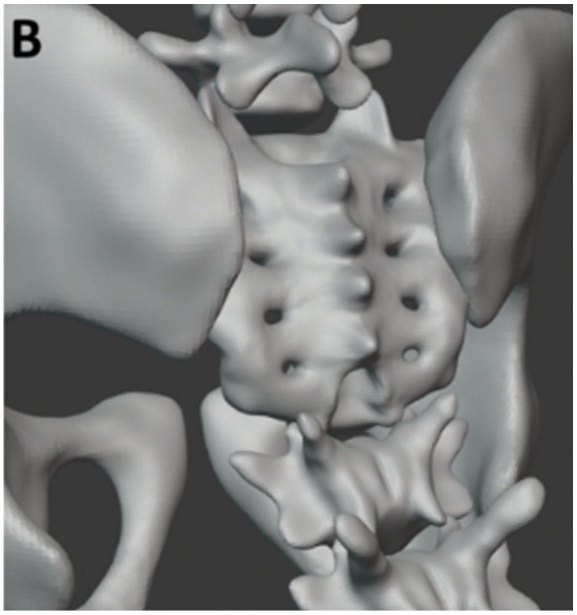
We've learned a lot since 2018, and we're able to get a lot more detailed. Detail isn't a luxury - it's a necessary part of elucidating how transformations will give satisfactory results without falling into the "uncanny valley", and helps us subdivide problems in a way that can be solved by people working in parallel. The level of detail is, itself, also a microcosm of the level of complexity that our Computer-Aided Design application being produced by the 3D Anatomy project will have to handle.

The project team includes a technical core of Lathreas, Tilt, SiberDrac, and myself, and is assisted by Syralth, Fenris, and Svaros.

The tail is one of those anatomical areas that make us most nervous - basically, the head and the tail have some of the most demanding fine-scale anatomy, delicate innervation, large and dynamic structural loads, and have very small tolerances to avoid an uncanny valley appearance. Other areas of anatomy, such as the hands and feet, certainly have demands as well, but the head and tail are what really keep us up at night.

To help us…well, make *heads or tails* of this situation (ahem), I've personally been analyzing what the anatomy of the tail will look like.

I've led the creation of a 25-page document covering tail anatomy. It's written primarily as a "Requirements" document. It describes what our end-goals would be, often on a pass-fail basis. "Solutions" can be developed to fulfill those goals to a satisfactory standard - uncompromising on things that could lead to an "uncanny valley" or unsafe experience for the patient, but not imposing excessive demands that would cause unnecessary delays to research.

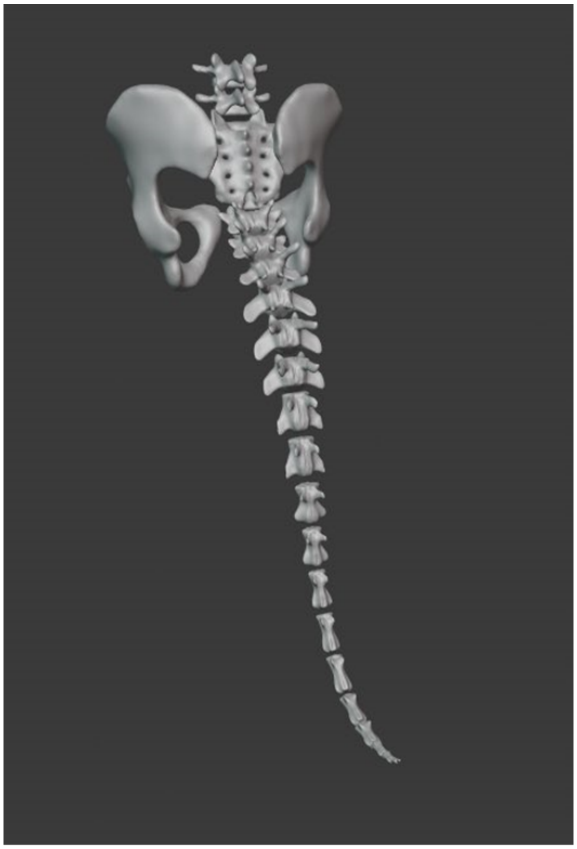


Example illustration from the tail anatomy requirements section of the Technical Roadmap, showing bones needed for anthro kangaroo and draconic tails. Panel A, not shown here, shows human equivalents for comparison.

As a result of this analysis, we've identified a few takeaways that are helpful for planning our research and development:

- It is possible to divide tails into at least two difficulty levels.
  - One relatively easier level that would be useful for canid and feline-like anthros.
  - A more difficult level for more muscular tails for kangaroos and reptilian-like anthros.
  - In this way, we can triage R&D projects tuned to those difficulty levels to help more people, sooner.
- Musculoskeletal system R&D:
  - Some existing bones will need modified *in-situ*, while other bones will need to be created.
  - Some existing muscles, tendons, and ligaments will need modified *in-situ*, while others will need to be created.
  - Separately, we have proposed a few ways to modify bones *in-situ* using a variety of technical options, such as surgeries (e.g. distraction osteogenesis), bioprinted tissues, and gene therapies). Based on this tail analysis, many of the proposals still hold water.
- Integration with the nervous system is still an important research area.
  - We feel comfortable with some technical options, including neuroprosthetics, that should help make for lifelike control of tails.
  - We have some ideas for sensory integration of tails, including touch and proprioception, but still need to work more on this area.
- Managing complexity:
  - We've come to appreciate there are still biomechanical unknowns in the area. How exactly do the bones and muscles need to be shaped? What forces will be exerted, and when? These are necessary considerations for creating tails that are lively and aren't vulnerable to injury.
  - We can't avoid this complexity any longer; it's our responsibility to

take it on, and it can't wait for the 3D Anatomy project to complete, either. Therefore, we've started comprehensively covering bones and muscles in the area, and artistically building 3D models, which can be incorporated into the 3D Anatomy project's engine at a later time.



Full tail bone model in all its glory

It's worth remembering that this document is still a first attempt at engineering documentation, and it will certainly be improved in the coming years as we continue to learn more and achieve research results.

It's not perfect, but this document is still *good*, and I'm proud of it. It will be a useful asset, both for our organization's R&D, and for people in the community who may be starting their own projects as well.

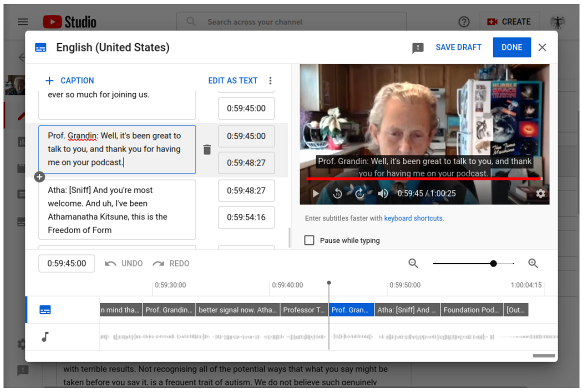
I hope you enjoy it! ...But do, please, read it with a cup of coffee close at hand. ;3

Here's our 25-page tail requirements document!

It's Only Words

by Athamanatha Kitsune on Tuesday 19th April, 2022

It's my pleasure to inform you that our popular interview with Professor Temple Grandin is now provided with manually entered subtitles. It might seem like a lot of effort to sink into essentially duplicating your content in a slightly different format, but for a significant number of the deaf and hearing impaired, those with ADHD and those who simply don't have working headphones to hand, they can make the difference between understanding our message and skipping the video.



ever so much for joining us. 0:59:45:00

Prof. Grandin: Well, it's been great to talk to you, and thank you for having me on your podcast. 0:59:45:00 0:59:48:27

Atha: [Sniff] And you're most welcome. And uh, I've been Athamanatha Kitsune, this is the Freedom of Form 0:59:48:27 0:59:54:16

Prof. Grandin: Well, it's been great to talk to you, and thank you for having me on your podcast.

0:59:45 / 1:00:25

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with terrible results. Not recognising all of the potential ways that what you say might be taken before you say it, is a frequent trait of autism. We do not believe such genuinely

Until AI tools are good at recognising my accent and those of my interviewees as well as I can, I will keep doing these in between my other tasks, and recommending that otherwise unoccupied others who don't yet feel interested in more complex tasks on the FFF server, join in too to help catch up with the rate of content production.

So if you've ruled out helping us any other way and still have time on your paws, give me a shout. We could always use a word.

Now you can follow our interview with subtitles

New Volunteer!

by Elapids on Saturday 9th April 2022

Hello! My name is Elapids (Ee-lay-pids). I have a BS in civil engineering from Michigan State University. I work in the exotic animal industry, and have spent the last 5 years leading my team to new heights and honing my abilities as a manager. A bit more about me personally, I am trans, and aro-ace, I have 2 pet snakes, and volunteer with alligators. I also have several existing body modifications including a tongue bifurcation :B I am excited to bring my years of management experience to the Freedom of Form foundation and support the goal of morphological freedom!

Federal Filing Fulfilled

By Athamanatha Kitsune on Tuesday 19th April 2022

In a significantly less stressful process than last year, we have prepared and e-filed (for it's now done online) Form 990-EZ and associated schedules and signature forms. This means we're up to date for federal tax year 2021 with the IRS, and can start to use our latest figures in state renewals and annual reports.

This is one of the many ways we need to keep our 'i's dotted and our 't's crossed to maintain our status as a 501(c)3 charity in good standing. Since we took our compliance in house, it has been possible to reduce costs and to think more flexibly and appropriately to our needs about which states we need to be registered in and why it's important for us. The quantity of bureaucracy is always a challenge for any charity, but fortunately there has been a reduction in physical paperwork to mail out as more states learn what a computer and the internet is for, a mere 20 years late.

It is my opinion that some states may have believed it more possible to forge a digital document than a paper one. I believe they have been increasingly coming to realise that each format is equally insecure at best, but that at least with the internet, you don't have to wait for the mail.

I wish to convey my gratitude to those state legislatures who have been able to set aside sufficient budget to join us in the 21st century. Here's hoping the remainder will catch up soon, and in the process of so doing, that they will review their online filing instructions and ensure they make full sense for charities domestic and foreign.

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We're on LinkedIn, Youtube, Soundcloud, Google Podcasts, Breaker, RadioPublic, Spotify, Pocket, iTunes, Anchor, Twitter, Telegram and Discord!
Why not check out our awesome perks on Patreon or if you prefer, drop us something nice via Paypal. You can also add us to your Amazon Smile orders in the USA! We have a variety of merch on sale in our Redbubble store too!

This edition of the newsletter was brought to you by science and engineering. Without science, engineering is botching. Without engineering, science is all talk and no action. Without magic (phenomenon x imagination), nobody is inspired to do either to figure out how the magic works. - Athamanatha

Freedom of Form Foundation Inc.
PO Box 400168, Cambridge, Massachusetts,
02140, United States of America